

Plant. n. 223) state that the plant has "propagines cylindricæ;" but Tenore, observing more accurately, ascribes to it "surculi tuberiformes, in quibus folia basi in membranam dilatata, quæ in caule florifero basi soluta." (Syll. 288.)

DeCandolle (*op. cit.*) likewise mentions this difference in the leaves, which is also exhibited in the above-mentioned figure, and he states with reference to it, that "on est conduit à penser que le petit appendice qu'on observe à la base des feuilles est une espèce de rudiment de la gaine des feuilles." (*Loc. cit.* p. 35.) However, this formation of aerial tubers, if we may so express ourselves, seemed to deserve closer attention, for no similar formation has hitherto occurred to me, or been observed to my knowledge, at least in Dicotyledons.

I will lastly observe, that *Sedum amplexicaule* differs from the other species of this genus, not only in the number of pistils and in the mode of reproduction, but likewise by the structure of its calyx, each sepal being externally considerably excavated, while a prominent angle reaches from each sinus to the base, giving the calyx a septangular or octangular appearance. These characters deserve to be recommended to some manufacturer of genera for the creation of a new genus.

LX.—*Anatomical and Organogenical Researches on Lathræa clandestina.* By M. DUCHARTRE*.

THE complete history of a plant from its origin at the period of germination to the moment when, after having given birth to new seed, it has accomplished all the phases of its existence, is still wanting in botany; for the type studied minutely in all its details, in an anatomical and physiological point of view, which man furnishes to zoology, does not exist in the vegetable kingdom; numerous materials, it is true, have been brought together for the history of some plants, but there are none in which some gap does not remain which it is essential to supply.

The description of most plants is limited to that of their external forms with respect to the organs of vegetation, and the organs of reproduction have alone been examined generally with more detail. Among the phanerogamous plants, the madder is perhaps the only one which has been the object of an investigation of this nature, profound and almost complete, due to M. Decaisne.

It would however be desirable, both for the interest of vegetable anatomy in general and for the application of anatomical

* Abstract of a Report laid before the French Academy by MM. de Mirbel, Richard, and Ad. Brongniart, April 28, 1845.

characters to natural classification, that all the essential organs of a certain number of the principal types of the vegetable kingdom should be examined with care. Many facts considered as general would lose this universality, and the greater or less frequency of the exceptions would soon establish the value of characters and the importance of such or such a point of organization.

The memoir of M. Duchartre on *Lathræa clandestina* is an excellent example of this kind of investigation, in which many points are treated in a very complete and satisfactory manner, and in which only a small number of gaps would remain to be noticed.

But this memoir acquires an additional interest from the nature of the plant which is the subject of it. The mode of existence of parasitical plants is always an interesting problem to solve, and the anatomical examination of their organs must serve as a starting-point for physiological researches.

Several of these vegetables have already been the object of minute research, among which must be cited in the first rank that of Mr. R. Brown on *Rafflesia*, then those of M. Unger on parasitical plants in general, of M. Goeppert on the *Balanophoræ*, and lastly, the researches of Mr. Bowman on another species of the same genus *Lathræa*, viz. *L. squamaria*. But, if we except the first of these memoirs, the other treatises have almost had for their sole object the mode of implantation of the parasites on the plants from which they draw their nourishment, or some peculiar points of their organization. M. Duchartre, on the contrary, has proposed to study successively all the organs of the curious plant which forms the subject of his researches; he presents an anatomical monography of it, and this step has led him to discover several important facts in the structure of this species.

We shall follow him in the examination of the various organs of vegetation and reproduction, noticing rapidly the points by which the organization of this plant appears to differ from that of the vegetables which have already been studied by other anatomists; and we may observe, that we have been able to verify the majority of the facts advanced by M. Duchartre, and represented in the numerous drawings which accompany his memoir, by means of fresh specimens, or specimens preserved in alcohol.

The structure of the stem is first studied by M. Duchartre; he finds in it, as in all the stems of Dicotyledons, the pith, the ligneous system and the cortical system formed of the liber and of the cellular envelope; but he notices two characters which appear to remove this plant from the usual structure of these vegetables. The first consists in the absence of a medullary sheath, that is to say, of a first interior zone of vessels of a different nature to those

of the ligneous zone, and comprised between the pith and this ligneous zone. It is these vessels which in the ordinary Dicotyledons belong to the form designated by the name of true spiral vessels or of unrollable spiral vessels, and it is in this position alone that these vessels are found in the stem. Here nothing similar occurs; the vessels nearest to the pith consist of finely reticulated vessels, similar, although finer, to those which exist in the rest of the ligneous layer. There are no tracheæ with a continuous free and unrollable spiral fibre.

This character, however, although forming an exception to the most usual organization of dicotyledonous plants, is met with in other vegetables of this class, and particularly in most parasitical plants, although the unprecise manner in which authors apply the word *spiral vessels* may sometimes leave a doubt on this point.

A second remarkable character of the ligneous body of this plant consists in the complete absence of medullary rays. This fact is well established by M. Duchartre, and is placed beyond all doubt. The ligneous zone is entirely formed of cells elongated in the longitudinal direction of the stem and consequently parallel to the pith, intermixed with more or less finely reticulated vessels, and thus appearing most frequently radiated or punctated; it is not interrupted at any point by those lines of cells in a radiating direction, which, extending from the pith toward the bark, constitute the medullary rays.

An analogous structure had been already noticed by M. Brongniart in a family very far removed from the *Lathrææ*, in the *Crassulacæ**, in which the ligneous zone is equally unfurnished with medullary rays, and is only constituted of tissues elongated in the direction of the axis and perfectly continuous.

Having desired to ascertain whether, in the family to which the *Lathræa clandestina* belongs, this character was found in any other plant, we found that the *Melampyrum sylvaticum* presented the same continuity in the elongated tissues of the ligneous zone, and that there was also a complete absence of medullary rays.

We thus find in several Dicotyledons an organization of the stem which we were far from suspecting some years ago, and which deserves the attention of physiologists.

The bark presents, in its elongated internal tissue forming the liber, the same continuity, in consequence of the absence of the medullary rays which ordinarily extend from the wood into the bark. The tissue which constitutes this internal cortical layer has the greatest analogy with that which forms the non-vascular part of the ligneous zone; only it is more opaque and more solid

* See "Observations on the Internal Structure of the *Sigillaria elegans*," &c., by M. Ad. Brongniart. (Archives du Muséum, tome i. p. 437.)

towards the exterior, more delicate, and at the sides thinner in the internal part in contact with the exterior of the wood.

In no part has M. Duchartre been able to detect proper or laticiferous vessels.

But if the zone of elongated ligneous tissue forming the wood and the liber constitutes a continuous cylinder around the pith, and not a series of distinct fascicles separated by the medullary rays, as is usually the case, it is not less true that the vessels there form separate fascicles and of a definite number. This is shown by the researches of M. Duchartre on the successive development of the stem and the tissues which constitute it. The vessels form at first four quite distinct fascicles; they then divide into a greater number, and we count eight, ten, twelve, and even more; lastly, the vessels appear dispersed with irregularity in the whole of that zone, which itself, on old stumps of at least two years, acquires a much greater thickness, and is often formed of two distinct concentric layers.

Thus, notwithstanding these two essential points, by which the stem of the *Lathræa clandestina* differs from the ordinary structure of Dicotyledons, the absence of spiral vessels and of the medullary rays, its growth is effected according to the mode proper to the totality of these vegetables.

The root, in its principal parts and even in its fibrils, presents the same structure as the stem, modified, as is generally the case, by the absence of the pith; but the parasitism of the plant gave a peculiar interest to the investigation of the extremities of the radical fibrils by which it is fixed on the roots of trees, and most frequently on those of the poplar.

This point however, which has been already examined carefully by Mr. Bowman, in *Lathræa squamaria*, could present fewer new facts; indeed the differences between these two species in this respect are very slight, and M. Duchartre has only been able to add some details and to point out some secondary differences between these two plants.

The *L. clandestina* attaches itself to the roots of trees by numerous suckers terminating in radicles, or growing laterally along these fibrils and representing spongioles. These suckers, nearly hemispherical, are larger than those of *Lathræa squamaria*; their surface of adherence is plane or slightly concave, formed of a cellular tissue of a peculiar form, elongated and directed perpendicularly on the external surface. The small tubercle which the sucker itself forms is essentially cellular, but traversed, especially toward its centre, by numerous moniliform vessels with reticulated sides, which however do not extend as far as the surface by which the sucker is applied on the foreign root; an arrangement

which would thus differ from that stated by Mr. Bowman in *Lathræa squamaria*.

The majority of the plants parasitical on roots are destitute of true leaves, these organs being reduced to short scales which seem to correspond only at the base of the petioles ; this is seen in the *Orobanchæ*, *Monotropa*, and several exotic plants which present the same mode of growth, and these reduced and abortive leaves appear, as well as the stems, generally destitute of those epidermal pores designated by the name of stomata.

The appendicular organs of the *Lathræa* present a very different form and structure, although short and imbricated like scales ; they are narrowed at their base into a sort of petiole, and present a true cordiform fleshy limb, analogous to that of the leaves of certain succulent plants. Mr. Bowman had already indicated the large regular gaps which traverse the interior of these kinds of leaves, but he believed these organs to be destitute of stomata, and it was not till within a few years that Dr. Schleiden noticed the existence of these pores on the leaves of *Lathræa squamaria*. M. Duchartre had discovered these organs, not only on the cuticle of the leaves, but on that of the stems of the *L. clandestina*, and at a period when he could not know of the observation of Dr. Schleiden, and had insisted on this exception to a character considered as general among the plants parasitical on roots.

His memoir contains, moreover, a very complete anatomical description of these rudimentary but complicated leaves, of their nerves, of their parenchyma and of the empty spaces which regularly occur in them, and of the papillæ which clothe them ; finally, the mode of evolution of these organs is carefully followed out, and it is one of the most complete chapters of the history of this remarkable plant.

With respect to the organs of reproduction, the plant which was the object of the examination of M. Duchartre did not present any singularity which might lead us to presume anything very peculiar in their structure ; but, as we have said at the commencement of this Report, a complete anatomical description of the different organs of a vegetable is still a thing so rare as to offer considerable utility to science by the means of comparison which it permits of our establishing at a later period.

In this point of view, the anatomical investigation of almost all the parts of the flower of *L. clandestina*, such as M. Duchartre has given, deserves great praise ; but the author has moreover directed his attention in a special manner to the mode of development of the different floral verticils. Thus the mode of appearance of the calyx, the corolla, the stamina and the pistil, the changes which take place in the anthers and the ovary have been

carefully traced, and some of the theories propounded on this subject have been discussed on this occasion; but we do not think it necessary to consider them here, as the *L. clandestina* does not offer anything peculiar in this respect.

It is also to be regretted that M. Duchartre has not been able to follow out the mode of formation of the embryo and its subsequent germination.

Notwithstanding these slight omissions, the investigation of M. Duchartre is not less one of the most complete on the anatomy and organogeny of a particular vegetable; it has appeared to us very exact in all the points which we have been able to verify, the author is quite conversant with the modern labours relative to the different subjects which he has treated, and we are of opinion that it would be desirable for the progress of botany that the science should possess several anatomical monographs made with the same care. For these reasons, we propose to the Academy to give its approbation to the memoir of M. Duchartre, and to insert it in the 'Mémoires des Savants Etrangers.'

LXI.—*On the Growth of the Stem of Palms, and on the Decurrence of the Leaves.* By M. VON MARTIUS*.

PERMIT me to present to you some pages of the Bulletin of our Academy, in which I have stated the results of my researches on the growth of the stem of Palms, and on the decurrence of the fibres. These results may be reduced to the following points:—

1. The stem of Palms does not contain more fibres than are destined to enter sooner or later into the leaves.

2. The fibres originate on the summit of the stem, *in nucleo gemmæ, vel in phyllophoro Mirbelii*, between the new and plastic parenchyma which there forms a peculiar conical layer, covering, like a funnel, the more aged parts. They are always external with relation to the others, which are already formed, and a little higher.

3. The points of origin of the fibres are organically predisposed; we find, in these points, the fibres situated obliquely, and converging at their upper ends. They are elongated from the two ends, that is to say, *they grow from below upwards and from above downwards.*

4. The upper extremity of these fibres is directed towards the base of the young leaf; the latter originates in the form of a cellular fold (*plica, crista*) in the centre of the bud, and is conducted toward the periphery on becoming enlarged.

* Being an extract of a letter to M. Flourens, Comptes Rendus for April 7, 1845.